



Pacific Island Network News

Newsletter of the
Pacific Island Network
Inventory & Monitoring Program
Jan.-Mar. 2006, Issue no. 03

Board of Directors Note, Pg. 2

Doug Lentz, Superintendent of the USS *Arizona* National Memorial and Chairman of the I&M Board of Directors shares his perspective of the I&M Program.

Notes from the Field - Anchialine Pools, Pg. 4

Inventory technician Lori Tango reports on the significance of anchialine pools found throughout PACN parks.

Featured Resource - Mixohaline Waters Pg. 6

The delicate mixture of salt and fresh-water plays important roles in the natural and cultural histories of the PACN.

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Red footed booby soaring above Pola island in the National Park of American Samoa. Photo by Tavita Togia

Aloha. Talofa. Hello. Tirow. Hafa adai.

There are so many ways to welcome you to the National Park Service's widest and wettest network, covering thousands of miles of the South and Central Pacific Ocean. Dotted with a handful of islands supporting National Parks, the Pacific Island Network (PACN) includes protected areas on the naturally and culturally rich islands and archipelagoes of Hawaii, American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands.

In this edition of our newsletter, we discuss the

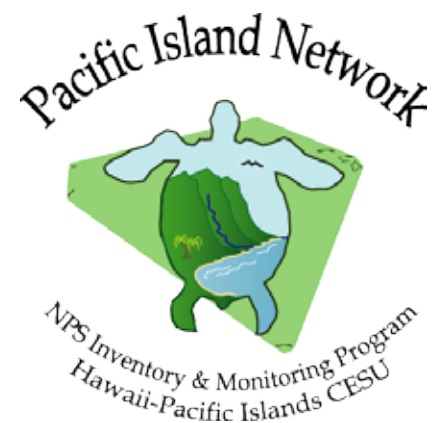
Be part of the action! Let us know of topics or material you think we should include.

threat of tropical cyclones, and feature one of our eleven unique and spectacular parks, the National Park of American Samoa.

This newsletter is for everyone, yet targets PACN Board of Directors, Technical Committee, Park Service staff, and program cooperators. This includes the Cooperative Ecosystem Studies Unit, the United States Geological Survey and others involved in conducting inventories, preparing monitoring protocols, or collaborating on other numerous projects.

We also highlight the brackish water resources of PACN parks. This 'featured resource' section provides an integrated and concise overview of one of the many resources the NPS strives to preserve and protect.

We hope you enjoy this news about the Pacific



Island Network I&M program, our work, and our findings in this enormous, unique, and beautiful slice of the world. Through this newsletter, we share with you a brief glimpse of the issues we tackle and the work that we do in and for America's National Parks in the Pacific.



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The National Park Service has implemented natural resource inventory and monitoring on a servicewide basis to ensure all park units possess the resource information needed for effective, science-based management, decision-making, and resource protection.

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Mailing List:

Please pass this newsletter on to interested parties. To be added to or removed from mailing list, please contact Cory Nash.

Note from the Board of Directors — Doug Lentz

Aloha. My name is Doug Lentz, and I am the superintendent at the USS Arizona National Memorial on Oahu, Hawaii. The USS Arizona was hit early in the Japanese surprise attack on December 7, 1941 which launched the United States into WWII. It is still the most tragic single ship disaster in U.S. Naval history as 1177 men died in approximately nine minutes, and most are still entombed within the ship.

What does this have to do with natural resources, or the Inventory and Monitoring (I & M) Program? The National Park Service (NPS) is the caretaker of the ship. Although it may be one of the biggest artifacts with which the NPS works, it is also home to many natural resources and the water around it directly affects those resources. The NPS mission is to preserve and protect for future generations the special places that embody our national heritage. That is what the I & M program is all about. You cannot protect what you do not know you have. Moreover, you cannot assess the state of a resource unless you establish baseline inventories of the resource, and then establish a protocol to monitor it.

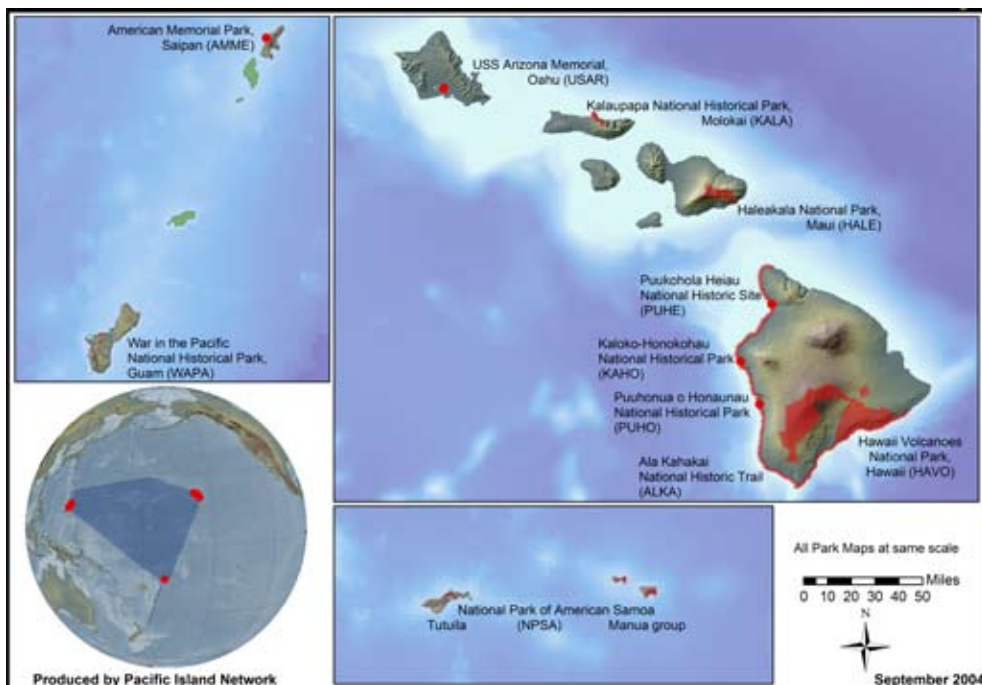
The I & M program is made up of dedicated hard working experts. These professionals pro-



List of names of the U.S. soldiers who lost their lives on the USS Arizona -Photo by Allison Snyder

vide essential guidance to superintendents on a daily basis. They add a dimension of excellence by being part of the I & M program, and that program is a vital part of furthering the mission of the National Park Service. My hat is off to all those involved in the I & M Program and the program itself.

Remember Pearl Harbor!!!



Map of the Pacific Island Network and its 11 park units.

Inventories - Kahuku Unit (HAVO)

Hawai'i Volcanoes National Park acquired the 47,350 hectare Kahuku Unit in 2003. This annexation doubled the park in size with its expanse of highly diverse native habitats. The unit extends from 3,800 m elevation down the south flank of Mauna Loa to 600 m, consisting dominantly of exposed lava terrain to about 2,200 m. However, the Kahuku Unit also contains tracts of native forest and woodland, and borders other conservation management areas including: the Ka'ū and Kapāpala Forest Reserves and the Manukā and Kipāhoehoe Natural Area Reserves administered by the State of Hawai'i, and the Kona Hema Preserve managed by The Nature Conservancy. Kahuku and adjoining areas support critically important habitat for some of the island's indigenous, endemic, and endangered flora and fauna.

The I&M program conducted several inventories in the Kahuku Unit in an effort to document 90% of the species present (an I&M goal), and to provide information on distribution and relative abundance. Vegetation, forest

bird, and invertebrate surveys were conducted in 2004 – 2005. The results from these inventories will help guide the development of monitoring protocols.

During the vegetation surveys, five listed endangered, one candidate endangered, and six plant species of concern were documented in the Kahuku Unit. Of the five endangered species three are new to the Park: Ka'ū silversword (*Argyroxiphium kauense*), 'ohā wai (*Clermontia lindseyana*), and hāhā (*Cyanea stictophylla*). An additional 21 species were documented and mapped as rare or uncommon at Kahuku.

Ten native and 14 non-native bird species were detected during surveys in Kahuku. The natives include: Hawaiian hawk ('i'o) (*Buteo solitarius*), Pacific golden-plover (kōlea) (*Pluvialis fulva*), Hawai'i 'elepaio (*Chasiempis sandwichensis*), 'ōma'o (*Myadestes obscurus*), Hawai'i 'amakihi (*Hemignathus virens virens*), 'i'iwi (*Vestiaria coccinea*), and 'apapane (*Himatione sanguinea sanguinea*). This inventory documented three

endangered bird species extirpated from other areas of the park: 'akiapōlā'au (*Hemignathus munroi*), Hawai'i 'ākepa (*Loxops coccineus*), and Hawai'i creeper (*Oreomystis mana*). The data collected provide population and density estimates on bird species in the Kahuku addition, which serves as a baseline for long-term monitoring and management of native forest birds.

The invertebrate inventory yielded a potentially new native species of *Hylaenus* (yellow-faced bee). This species is very similar to an endemic species from Maui. Picture-winged *Drosophila* (*D. conspici*) was documented as well. Invasive ants appear to be limited to the highly-disturbed areas in Kahuku (e.g. ranchlands), a hopeful sign for the native insect community.

The data from these inventories are being entered into Service-wide NPS databases (e.g. NPSpecies and NatureBib) and reports will be made available to the public in the near future.

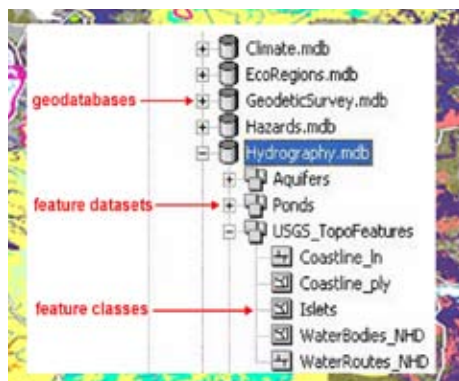
—Kelly Kozar

Data Management - ArcGIS Geodatabase

On her popular television show 'Martha Stewart Living', the audience hears Martha Stewart say "It's a good thing!" as she demonstrates the latest tips for cooking, gardening, or home decorating. What exactly is a geodatabase? And what does it have to do with Martha? Basically, a geodatabase is a collection of geographic features (GIS map layers) that can be used in ArcGIS. A geodatabase defines the types of data and how they are represented, stored, managed and accessed. In a geodatabase, map layers are structured to work together as an integrated system using rules, relationships, and topological association. A geodatabase can be created, edited and managed using mapping tools called ArcCatalog, ArcMap, and ArcToolbox.

There are two types of geodatabases: personal and multi-user. I&M uses personal geodatabases on the GIS server. A personal geodatabase typically contains several feature datasets (see diagram). Each feature dataset is a collection of feature classes (lines, points, and polygons) that have been grouped together so

they can relate topologically with each other. All feature classes in a feature dataset must share the same spatial reference. In other words, they must have the same coordinate system and their features must fall within a common geographic area. Feature datasets and feature classes are the essential components of a geodatabase. Is this confusing? This is where Martha comes in. Picture her kitchen, particularly the cabinet where she keeps her polished silverware.



This ArcCatalog directory contains 5 geodatabases. Within the "Hydrography" geodatabase, there are 3 feature datasets. Within the "USGS_TopoFeatures" dataset, there are 5 feature classes.

Imagine opening this cabinet and seeing a tray (geodatabase) with several compartments (feature datasets); within each of the compartments you see different sets of forks, knives, and spoons (feature classes). Metaphorically speaking, Martha's perfectly organized silverware cabinet resembles the basic structure of a geodatabase!

A geodatabase promotes centralized GIS data management, supports multi-spatial and tabular data formats, provides more accurate data editing with validation tools, and allows you to set up topology rules to govern relationships between features. Just as Martha would never allow salad forks to be mixed with tea spoons in her cabinet, a geodatabase will not let you put a Guam soil feature class into the same dataset containing a Maui vegetation feature class! In all, geodatabases provide a powerful way for you to establish and maintain the quality and integrity of your GIS data. Therefore, as Martha might say, "geodatabase – it's a good thing."

—Viet Doan

Monitoring

In a previous newsletter, we listed 34 critically important Vital Signs selected for long-term monitoring within the Pacific Island Network. Of these 34, a subset of 13 were already being monitored, while 21 Vital Signs were to have protocols prepared to National I&M program standards.

The number of Vital Signs for which the network will be preparing protocols is now 13, with an additional 5 Vital Signs (plus 3 Phase One Vital Signs with expanded scope) slated for future development. To clarify, 13 Phase One Vital Sign protocols are being developed between 2005 - 2008. In Phase Two (2008 and beyond), the network will develop five new protocols and expanded objectives for three Phase One (see list*) protocols. The evaluation to determine if Phase Two protocols will proceed will

include consideration of fiscal, human, as well as natural resource priorities. (See page 5 for more information).

This revision to 13 Phase One Vital Signs streamlines bats and freshwater animals each into single Vital Signs, and eliminated the Viewscapes Vital Sign.

The I&M Program looks forward to continuing interactions with our myriad partners throughout the Pacific Region as we work together toward the realization of Vital Signs monitoring development.

Notes from the Field

When asked what sort of work I do, most people have blank looks on their faces when I respond, "I conduct inventories of aquatic invertebrates in anchialine pools in Hawaii's National Parks." Judging by their confusion, I usually break it down by explaining that anchialine pools are rare coastal waters that exhibit tidal fluctuations and possess measurable salinities but lack a direct surface connection to the sea. Such pools are restricted to highly porous substrates (e.g., recent lava flows) and, in the U.S. are only found in Hawaii. Anchialine pools are where one might find charismatic shrimp, flies, crickets, snails, damselflies, dragonflies and in rare instances, a blind eel.

We have surveyed approximately 150 anchialine pools in Hawai'i Volcanoes National Park, Kaloko-Honokōhau National Historical Park, Pu'uhonua o Hōnaunau National Historical Park, Pu'ukoholā Heiau National Historic Site, and Kalaupapa National Historical Park. Inventory results suggest that aquatic insects are the dominant native invertebrate group with flies, dragonflies and damselflies comprising

roughly 70% of the fauna. Native snails, shrimps, and crickets accounted for the remaining fauna, with highly variable densities from site to site.

The rarest native pool invertebrate is the endemic orange-black Hawaiian damselfly (*Megalagrion xanthomelas*) found at only 6 pools (KAHO, PUHO and KALA). This Hawaiian damselfly favors pools with some degree of canopy cover for protection from the hot sun. This once abundant coastal species is under consideration for listing as Endangered by the U.S. Fish and Wildlife Service.

Prior to European contact, Hawaiians frequently modified anchialine pools to serve as potable water sources, baths, and fishponds. The impacts of traditional Hawaiian practices on the pools may have been minimal; but modern practices such as coastal development and the introduction of non-native species seriously threaten many anchialine pool systems. Nevertheless, the native fauna, unique basin morphology and rich history makes studying anchialine pools a rewarding way to spend a day at the coast!

—Lori Tango



Perched tandem *Megalagrion xanthomelas* at PUHO

VITAL SIGNS

Phase One

Climate
Groundwater dynamics*
Water chemistry
Status and trends of invasive plant communities
Early detection of invasives: plants*
Benthic marine community*
Marine Fish
Freshwater animal communities
Focal terrestrial plant communities
Landbirds
Seabirds
Bats
Land use patterns

Phase Two

Erosion and deposition
Cave community
Focal and RTE plant species
Terrestrial Invertebrate communities
Fisheries harvest
Groundwater dynamics*
Early detection of invasives: invertebrates*
Benthic marine community*

Featured Staff

Gordon Dicus

(NPS Pacific Island Network Data Manager)

Gordon came to the PACN in 2003, and lives in Volcano with his wife and two young sons. With a background in wildlife biology, he worked for 10 years in Glacier National Park on various projects involving raptors, large carnivores, and ungulates. In earning a wildlife biology Masters degree from the University of Montana, Gordon developed a predictive model for bighorn sheep winter range habitat use. He has since traded in his cross country skis for a snorkel mask, and his field binoculars for a very busy computer mouse. As PACN Data Manager, he coordinates database development and directs network strategies for the maintenance and dissemination of natural resource data and information.



Fritz Klasner

(NPS Pacific Island Network Ecologist)

Fritz has been with the PACN Inventory and Monitoring program since 2002. He previously worked for USGS Water Resources in Honolulu, and with USGS and NPS Global Change programs in Hawaii Volcanoes and Glacier National Parks. Fritz received a Masters degree from Oregon State University in Resource Geography, looking at visitor use patterns and changes in alpine treeline environments, as well as working with water in its various phases. He lives on the Big Island of Hawai'i with his wife and daughter.

Gordon (left) and Fritz "diving for data" at the National Park of American Samoa

Program Update

Monitoring Plan: In mid-December 2005, the PACN successfully navigated the milestone of completing our Phase 3 version of the PACN monitoring plan, and submitting it for peer-review to the Washington Support Office (WASO). Our dedicated staff and many gracious outside reviewers logged months of work to prepare this draft. The final version is due to WASO by September 30, 2006. Our hats off and sincerest thanks to everyone involved in the long, arduous, and rewarding process. The most recent version of our monitoring plan is available online; <http://science.nature.nps.gov/im/units/pacn/monitoring/>

Vital Signs: The most recent change to the I&M Program is the Board of Director's decision to reduce the number of Vital Signs to be monitored in PACN parks. This affects the Program in many ways, as outlined in the 'Monitoring' section of this newsletter.

In November 2005, we conducted a second successful statistician workshop to devise sampling schemes for Vital Signs. Statistician John Skalski met for one intense week with many of the Vital Sign protocol Principal Investigators (PI), discussing sampling designs and methods tailored to each protocol. This statistician and PI input was also used in preparing the sample design portion of our monitoring plan.

Several Vital Sign protocols are underway and many others are preparing for take off. The Ben-thic Marine Vital Sign protocol group submitted

THE
NATIONAL
PARK SERVICE CARES
FOR THE SPECIAL PLACES
SAVED BY THE AMERICAN
PEOPLE SO THAT ALL MAY
EXPERIENCE OUR
HERITAGE.

a rough draft in mid-December. Worthy of consideration by other protocols is their use of modular, or park-optional Standard Operating Procedures (SOPs). Modular SOPs allow implementation of cohesive aspects of the protocol, with the option of adding or removing other elements of the protocol based on park-specific resource needs and funds availability.

Staffing: In this new year we said goodbye to two of our cooperators, Jean Franklin and Sonia Stephens. Both have contributed immensely to the I&M Program and will be missed. We wish them both the best in their new endeavors.

Tahzay Jones will be our new I&M staff, serving as Aquatic Ecologist. Most recently, Tahzay worked with the Southwest Alaska Network, stationed at Katmai National Park and Preserve. We also anticipate advertising for a term quantitative ecologist position this Spring, and will be filling some cooperator positions, including a data management associate.

All in all, 2006 looks to be another busy year for the PACN Inventory and Monitoring Program!

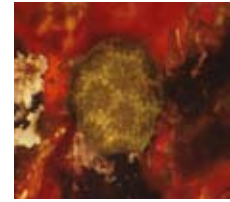
Games Corner

"Coral Corral"

Although they may not seem like animals, countless corals work together over many years to create the beautiful reefs that we see in the ocean surrounding PACN parks. Can you identify the young coral recruits from other marine life? Be careful, some of the below pictures are not corals.

Bonus: [find the adult coral](#)

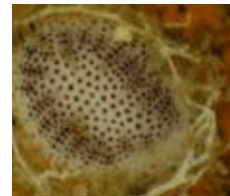
Did you know that a coral can grow from 0.5 to 3 inches per year depending on the species and conditions?



1



2



3



4



5



6



7

Photographs courtesy of Eric Brown

ANSWERS:

1-Portites (coral recruit) 6-Montipora (coral recruit)
2-Antheia 7-Foraminiferan
3-Bryozoan 4-Pocillopora (coral recruit)
5-Montipora (adult coral)

Calendar • January - March, 2006

Jan. 18 = After dark in the Park at Pu'uuhonua o Hōnaunau, presented by Leslie HaySmith and Cory Nash
Jan. 30 = Pacific Island Network, Board of Directors tele-conference
Jan 31. = Annual Administrative Report and Workplan for Fiscal Years 2005–2006 due to national office
Feb. 6–10 = National I&M meeting in San Diego, CA
Feb. 20–24 = Ocean Sciences Meeting in Honolulu, HI
Mar. 15 = Semi-annual PACN Board of Director's meeting
Mar. 15 = Task agreements with any PWR CESU (e.g. Hawaii-Pacific Islands CESU), for projects starting this summer, due to appropriate contracting officer. Note: H-PI CESU NPS research coordinator, Darcy Hu, will be on travel from March 6-10, so please submit draft TAs - ASAP
Apr. 3-7 = National I&M Data Management meeting in Fort Collins, CO
Ongoing = Revision of Vital Signs Monitoring Plan, final version due Sept. 30



Mixohaline Waters

Description: Often referred to as 'brackish', mixohaline describes the delicate balance of water that is neither fresh nor marine. So why should we be concerned about mixed-up waters? Coastal wetlands, estuaries, anchialine pools, and some groundwaters are examples of these biologically and anthropologically vital resources. These water bodies provide unique habitat for organisms that include fish, waterfowl, rare shrimp, and plants.

On many oceanic islands, fresh water (supplied by rainfall) can be found underground floating on a layer of brackish water called the “transition zone.” These layers of fresh and brackish water flow down to the margins of the islands and mix with seawater filtering through the rocks below. Groundwater flow influences the condition of biotic habitats and communities primarily by supplying fresh water and nutrients to plants and animals.

Cultural Significance: Historically, mixohaline water bodies, although undrinkable, provided people with water for agriculture, aquaculture, bathing, food harvesting and processing materials. This resulted in human settlements gathered around these important water resources. Subsequently, coastal strand communities contribute to the accretion of beaches used by turtles and seals which were also sources of food. In Hawaii, resources from mixohaline habitats were often traded for resources from the forests or ocean.

Inventories: Related inventories in Pacific Island Network (PACN) parks include vegetation of the American Memorial Park (AMME) wetland, aquatic fauna of Kauhakō Lake in Kalaupapa NHP (KALA), and both flora and fauna of the fishponds and anchialine pools along the Ala Kahakai National Historic Trail (ALKA), which includes the National Parks on the island of Hawai'i. Accurate identification and mapping of the wetlands and anchialine pools is a vital component of these inventories.

Monitoring: Anchialine pool biota and water quality are presently monitored along ALKA, particularly at Kaloko-Honokōhau

NHP (KAHO) in conjunction with adjacent land use changes. As PACN Vital Signs protocols are completed, water quality, fish, and invertebrates will be monitored in many of the identified mixohaline waters.

Data: The three main databases compiled by NPS for the PACN (NatureBib, NPSpecies, and Dataset Catalog) provide the most comprehensive resource for the many types of mixohaline water bodies found therein. Additionally, the Natural Heritage Program of the Nature Conservancy of Hawaii published a biological database of rare species and natural communities in anchialine pools in Hawaii in 1987.

Status & Trends: Many mixohaline resources are impacted by people (e.g. developments). For example, human encroachment has negatively affected hydrology near the AMME wetland, threatening its unique flora and fauna. Human uses of the resources in and around Pearl Harbor have contributed to contamination of the groundwater. Anchialine pools and fishponds range from pristine to heavily impacted. Even reconstruction of the wall enclosing Kaloko fishpond is contributing to changes in its water quality. Only the remote anchialine pools of Hawai'i Volcanoes NP, and KALA's Lake Kauhakō are currently undisturbed.

Management: The extreme range of conditions found in these mixohaline habitats supports very specialized and rare biota necessitating management protection. The wetland in AMME has two endangered species of birds, the nightingale reed-warbler (*Acrocephalus luscini*) and the Mariana common moorhen (*Gallinula chloropus guami*); as well as a species of concern, the humped tree snail (*Partula gibba*). The top 4 m of Lake Kauhakō is brackish and supports an array of algae and invertebrates. Anchialine pools and fishponds contain fish, endemic shrimp, snails, calcareous algae, sea grass, and provide specialized habitat for endangered birds, native plants, amphibians, and the endemic Hawaiian damselfly (*Megalagrion xanthomelas*). Long-term monitoring of mixohaline water bodies and their biota should provide resource managers with the necessary information to sustain their critical existence.

For Questions or Comments Contact

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Where to see mixohaline waters:

Anchialine pools and fishponds are common in West Hawai'i National Parks. In addition, Lake Kauhakō in KALA and the wetlands of AMME are other important examples of mixohaline resources.



From left to right: Lake Kauhakō at KALA; Wetlands at AMME; and an anchialine pool at KAHO.

NPS photos



Tropical Cyclones

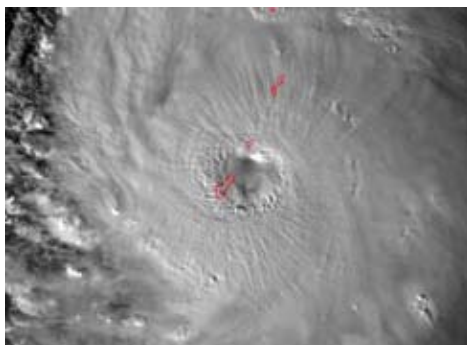
When the warning sirens blare and the wind picks up, what could we really be in-store for?

Description: A tropical cyclone is an organized tropical weather system of strong thunderstorms and well-defined circulation. Tropical cyclones with sustained winds of less than 38 mph are called tropical depressions. Once sustained wind speeds reach 39–73 mph they are referred to as tropical storms. Within the PACN, storms with sustained winds of 74 mph or greater are termed hurricanes in Hawaii, typhoons in the Marianas and severe tropical cyclones in American Samoa.

Tropical cyclones are products of (1) warm ocean waters (at least 80° F), (2) warm and moist atmosphere, (3) a distance of at least 300 miles from the equator for sufficient Coriolis force, and (4) suitable near-surface and vertical wind shear conditions. However, many instances of favorable conditions do not develop into tropical cyclones.

Occurrence in the Pacific Islands: In Guam and the Northern Mariana Islands tropical cyclones of Saffir-Simpson scale 1 strength or greater occur throughout the year. In Hawaii and American Samoa, they tend to occur during defined seasons (Hawaii: May – Oct.; American Samoa: Nov. – April). The western Pacific Ocean experiences far more tropical cyclones than the rest of the Pacific Ocean (see map). Yet the entire network region is susceptible; the frequency is dependent upon the presence of suitable conditions for formation and wind conditions that guide the path of an existing storm.

Destructive Forces of Tropical Cyclones: Tropical cyclones pose a variety of threats, which can extend hundreds of miles from the storm's center. Destructive forces include strong winds, heavy rains, flooding from runoff or from storm surge, and tornadoes. Islands are especially impacted due to finite land and coastal zone areas. The destruction of coral reefs leads to loss of biodiversity and robs the islands of natural protection from minor storms.



Super Typhoon Pongsona over the Mariana Islands, December 8, 2002. The term "super typhoons" refers to typhoons with sustained 1-minute winds of at least 150 mph.

Nutrient cycles are changed because tropical cyclones are significant drivers of erosion and deposition along coastal and inland waterways, as well as causing extensive defoliation. Salt stress, wind stress and flooding cause habitat alterations that particularly impact rare species or those with confined geographic ranges. Furthermore, these changes often facilitate the spread of alien species. Tropical cyclones also have a bearing on human populations and cultural resources as the storms threaten lives and alter physical structures such as homes, monuments, or seawalls.

Management Considerations: Public safety is the primary management consideration before, during, and after tropical cyclones. The passing of Super Typhoon Pongsona in the Mariana Islands in 2002 provides an excellent example of the effectiveness of education and preparedness. Despite sustained winds of over 150 mph, and the eye, or center of the storm, stationary over the island of Guam for over two hours, human fatalities were nil. Immediately after the storm, hotel mattresses were strewn over the beaches, the island's fuel depot was set ablaze by storm-generated static electric-

ity, and the visitor center at War in the Pacific National Historical Park was damaged beyond repair. Yet strong preparations and the public acumen during the storm prevented the loss of life and allowed emergency responders and managers to focus on other pressing concerns.

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How you can stay prepared:

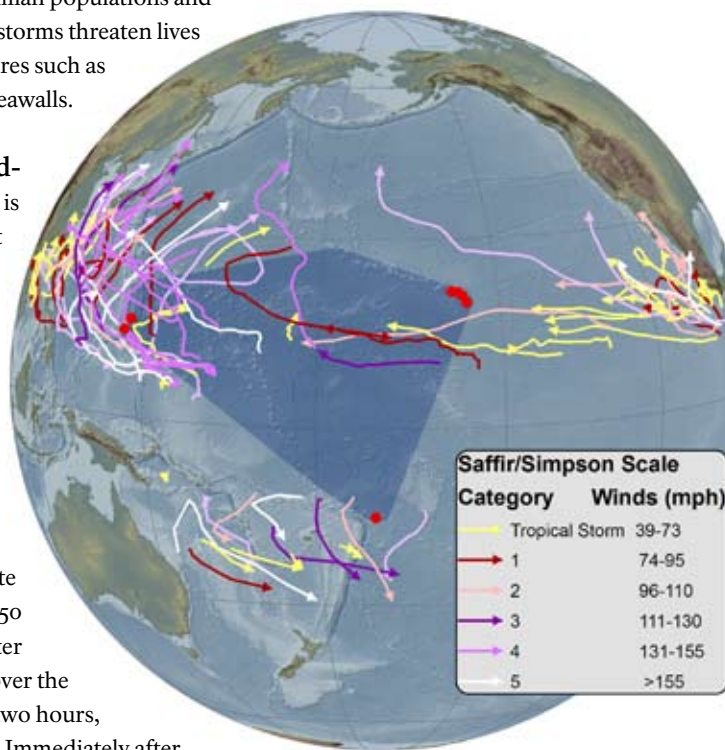
We can all do our part to educate ourselves about the hazards presented by tropical cyclones, and plan and prepare for them. A wide variety of valuable, local awareness and preparedness information is available through local meteorological and public safety offices and you can stay informed by tuning in to your local news (paper, radio, or TV). Regional advisory centers coordinate forecasts. For updates and more information:

<http://www.nws.noaa.gov/om/hurricane/>

<http://www.prh.noaa.gov/hnl/cphc/>

<http://www.met.gov.fj/>

<http://www.jma.go.jp/en/typh/>



Tropical Cyclone tracks in the Pacific basin during 2002–2003. Line color designates the maximum intensity reached during the life of the storm. Islands of the Pacific Island Network identified by a red dot.



National Park of American Samoa (NPSA)

Natural History and Resources: NPSA was established in 1988 and was officially sanctioned in 1993 by the signing of a 50-year lease agreement between the National Park Service and the American Samoa Government (ASG). In 2002, the US Congress approved a 30% expansion on the Manu'a islands and the lease agreement is in the process of being finalized with ASG. NPSA, the only National Park south of the equator, is comprised of three geographically distinct units located on the islands of Tutuila, Ofu, and Ta'ū. While each island possesses similar characteristics of paleotropical rainforest and Indo-Pacific coral reefs, they are each unique.

Tutuila, the largest and most populated island in American Samoa, is the location of NPSA Headquarters. This unit consists of approximately 2,500 acres of land and 1,200 acres of coastal water. Ta'ū is the only park unit where cloud forests occur with approximately 350 inches of annual rainfall. The tallest peak in American Samoa (Lata Mountain at 3,170 feet) and a pristine stream (Laufuti) are located here. The smallest unit, Ofu, encompasses coral beaches and a protected fringing reef.

Significant resources include pollinators (flying foxes), rare species (sheath-tailed bat, Pacific boa, spotless crake, many-colored fruit dove), coral reef community (890 coral reef fish species and over 200 species of coral), sandy and rocky beaches, rain and cloud forests, and a variety of flowering plants. Threatened and endangered species include the humpback and sperm whales, and the green and hawksbill sea turtles.

Cultural History: The Samoan culture (Fa'asamoa, translated "the Samoan Way") stems from a traditional lifestyle which places heavy emphasis on familial ties. An ancient tradition still being carried out involves the giving of fine mats (woven mat of pandanus leaves) as a gift during funerals, weddings, and the bestowment of village chief titles. NPSA recognizes the importance of the Samoan culture, and is documenting the history, myths, and legends of all eight villages affiliated with the park.

Interesting archeological sites within NPSA include: fale foundations, masi pits (method used to ferment breadfruit or bananas), star mounds (rock foundations approximately 7 feet high used to catch pigeons for competition), grinding stones, adze quarries, and the Saua site (a sacred site on Ta'ū).

Inventory and Monitoring Highlights:

Numerous plant inventories have been conducted resulting in a list of 470+ native flora species. Also, an inventory of the seabird population was conducted in 2002 to establish a baseline of the American Samoa seabird population. On-going inventory and monitoring of Samoan fruit bats is conducted on Tutuila. The bat data are used to track population trends as past tropical cyclones have significantly affected the bat population.

Inventory and monitoring projects of the coral reef community have also occurred. Recent projects include monitoring harvests of fish and invertebrates, and quantitative inventories of fish, corals, and selected macro-invertebrates. Future plans are to continue to inventory and monitor the coral reef community.

Current Issues in Management: One management focus is the removal of the invasive *Falcattaria moluccana* (peacocksplume or

tamaligi palagi). This large tree shades native vegetation, consequently destroying the forest. As of December 2005, 50% of this species was removed from the park. Plans are to remove the remaining trees by the end of 2006. Conversely, reforestation of the Tutuila park unit was started in 2001. Four acres of abandoned Samoan plantations have been replanted with 40 different native species. The purpose of this project is to both restore native plants to provide food and habitat for wildlife, and to demonstrate the need to preserve the forest to the public. The reforestation project will expand in 2006 by out planting 1,500 more plants.

Climate change which causes coral bleaching and disease due to warmer sea temperatures is also an imminent issue, as is overfishing. Fishing is primarily subsistence; however, a recent study suggests that 9% of the local catch of reef fishes were illegally taken from park waters.

—Risé Hart

Come visit us:

NPSA is located approximately 2,300 miles southwest of Hawaii. There are currently two-scheduled air flights weekly from Honolulu, Hawaii to Pago Pago International Airport. Air and boat transportation is available from Tutuila to Ofu and Ta'ū at irregular intervals. The NPSA staff recommends scheduling at least a two-week trip.

On the Web at: <http://www.nps.gov/npsa/>



From left to right (top to bottom): Coconut crab, Samoan fruit bat, Fala, Guineafowl puffer fish, leie flower

NPSA photos